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Electrical transport properties of CoSi/sub 2/ and NiSi/sub 2/ thin films.

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Source

Applied Physics Letters, {Appl–Phys–Lett–USA}, 1 May 1984, vol. 44, no. 9, p. 913–15, 11 refs, CODEN: APPLAB, ISSN: 0003–6951, USA.

Author(s)

Hensel–J–C, Tung–R–T, Poate–J–M–, Unterwald–F–C.

Author affiliation

Hensel, J.C., Tung, R.T., Poate, J.M.., Unterwald, F.C., AT&T Bell Labs., Murray Hill, NJ, USA.

Abstract

Transport studies have been performed on thin films of CoSi/sub 2/ and **NiSi**/sub 2/ in the **temperature** range 1–300K. The conductivities are metallic with essentially the same **temperature** dependence; however, the residual resistivities are markedly different even though the two silicides are structurally similar (the **room–**temperature resistivity of **NiSi**/sub 2/ being at least twice that of CoSi/sub 2/ of 15 muOmega cm). The difference is attributed to intrinsic defects in **NiSi**/sub 2/. This defect has been simulated by ion bombardment of the **film** where it is also shown that Matthiessen's rule is obeyed over a remarkable range of bombardment doses.

Language

English.

Publication year

1984.

Low–temperature diffusion of silicon atoms in the nickel–nickel silicide–silicon system.

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0002643349 20070101.

Source

Soviet Physics Journal, {Sov–Phys–J–USA}, March 1985, vol. 28, no. 3, p. 242–5, CODEN: SOPJAQ, ISSN: 0038–5697, USA. Translation from: Izvestiya Vysshikh Uchebnykh Zavedenii Fizika, {Izv–Vyssh–Uchebn–Zaved–Fiz–USSR}, March 1985, vol. 28, no. 3, p. 78–83, CODEN: IVUFAC, ISSN: 0021–3411. Country of publication: USSR.

Author(s)

Rodionov–A–I, Uskov–V–A.

Author affiliation

Rodionov, A.I., Uskov, V.A., A.A. Zhdanov Gor'kii Polytech. Inst., USSR.

Abstract

The diffusion of Si atoms from a silicon substrate through a **layer** of **nickel monosilicide** into a **Ni film** is investigated in the **temperature** interval 470–670K by the method of radioactive isotopes. The distribution profile of Si in **NiSi** and **Ni** is derived. The GB–diffusion parameters of Si in **NiSi** are determined. It is shown that when T>570K there is an increase in the thickness of the initial **NiSi layer,** and a kink appears on the 1n D=f(1/T) curve. The associated change in the activation energy of diffusion from 0.43 (470–570K) to 0.72 eV (570–670K) is explained by the formation of **Ni–**Si and Si–O type

complexes. The diffusion of silicon atoms accompanied by complex– formation processes determines the evolution of the resistivity of the **Ni–**NiSi–Si contact.

Language

English.

Publication year

1985.

Copyright statement

The growth processes of thin film silicides in Si/Ni planar systems.

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0002546568 20070101.

Conference information

Sixth International Conference on `Thin Films', Stockholm, Sweden,
13–17 Aug. 1984.

Source

Thin Solid Films, {Thin–Solid–Films–Switzerland}, 15 March 1985, vol. 125, no. 1–2, p. 71–8, 11 refs, CODEN: THSFAP, ISSN: 0040–6090, Switzerland.

Author(s)

Majni–G, Costato–M, Panini–F.

Author affiliation

Majni, G., Costato, M., Panini, F., Dept. of Phys., Modena Univ., Italy.

Abstract

All the compounds predicted from the **Si–**Ni phase diagram were observed by depositing thin layers of **nickel** onto silicon in known quantities and ratios to each other using an unreactive substrate such as SiO/sub 2/. After deposition, the samples were annealed in the **temperature** range 200–750°C and analysed using 2 MeV /sup 4/He/sup positive Rutherford backscattering spectrometry and X–ray diffraction techniques. **Ni**/sub 2/Si is the first phase formed at a low **temperature** (about 250°C). Under silicon–rich conditions the system develops in a reproducible manner, subsequently giving rise, when all the **nickel** was reacted, to the formation of **NiSi** and of **NiSi**/sub 2/ by reaction at 750°C of the **NiSi** with silicon. The kinetic diffusion approach accounts for the formation and sequence of **Ni**/sub 2/Si and **NiSi.** The phase **Ni**/sub 5/Si/sub 2/ forms between **Ni**/sub 2/Si and **nickel** under **nickel–**rich conditions. The phases **Ni**/sub 3/Si/sub 2/ and **Ni**/sub 3/Si were observed at 400°C and 450°C respectively.

Language

English.

Publication year

1985.

Copyright statement

Formation of Ni silicide from Ni(Au) films on (111)Si.

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0005277567 20070101.

Source

Journal of Applied Physics, {J–Appl–Phys–USA}, 15 April 1996, vol. 79, no. 8, p. 4078–86, 41 refs, CODEN: JAPIAU, ISSN: 0021–8979. Publisher: AIP, USA.

Author(s)

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Author affiliation

Mangelinck, D., Fac. des Sci. de Saint Jerome, CNRS, Marseille, France.

Abstract

The solid state reaction between a **Ni** (7 at. 96 Au) **film** and a Si substrate at temperatures ranging from 250 to 800°C is examined by scanning electron microscopy, X–ray diffraction, and Rutherford backscattering spectrometry. Compared to the usual features for thin **film** reaction of **Ni** with Si, we observed the following. (i) The simultaneous growth of **Ni**/sub 2/Si and **NiSi,** and the growth of **NiSi** at the expense of both **Ni**/sub 2/Si and **Ni.** This is related to Au accumulation in the metal **layer.** (ii) Au precipitation at 300°C followed by the dissolution of the clusters thus created above the Au– Si eutectic **temperature** (370°C). (iii) A decrease of the **temperature** of formation of **NiSi**/sub 2/ and the appearance of thickness oscillations that are characteristic of nucleation. These different effects are interpreted by taking into account the metallurgy of the system: segregation of Au in the **Ni film,** Au solubility in the different silicides, change in surface and interface energies, and chemical interactions with Si.

Language

English.

Publication year

1996.

In–situ investigation of the formation of nickel silicides during interaction of single–crystalline and amorphous silicon with nickel.

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0006937599 20070101.

Source

Journal of Alloys and Compounds, {J–Alloys–Compd–Switzerland}, 26 April 2001, vol. 319, p. 187–95, 23 refs, CODEN: JALCEU, ISSN: 0925–8388. Publisher: Elsevier, Switzerland.

Author(s)

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Bokhonov, B., Korchagin, M., Inst. of Solid State Chem., Acad. of Sci., Novosibirsk, Russia.

Abstract

In situ investigations showed that the sequence of phase formation during interaction of **nickel** particles with single crystalline (100) silicon and amorphous silicon corresponds to the following sequence of stages during the annealing of **thin–**film systems: (a) within a **temperature** range up to 500°C, the first and prevailing phase formed is **Ni**/sub 2/Si; and (b) annealing at temperatures above 600°C is accompanied by the formation and epitaxial growth of the **NiSi**/sub 2/ phase. The growth of the **nickel** disilicide crystalline phase is accompanied by the formation of dislocations both in the **nickel** disilicide phase and in the silicon phase. The interaction of the amorphous silicon **film** with **nickel** particles at temperatures above 600°C leads to the crystallization of several silicide phases: **NiSi** /sub 2/, **NiSi,** **Ni**/sub 3/Si/sub 2/. The formation of silicide phases due to the interaction of **nickel** particles with silicon during annealing did not confirm the formation of an intermediate amorphous silicide that was observed earlier in **thin–**film **nickel–**silicon systems. Irradiation with a beam of accelerated electrons in a

microscope leads to an increase of the rate of silicide phase formation and to a decrease of the **temperature** at which the **nickel** disilicide phase is formed epitaxially, at least to 400°C. In our opinion, the observed effect can be due to the formation of defects in the structure of single crystalline silicon.

Language

English.

Publication year

2001.

Copyright statement

Search Strategy

No.	Database	Search term	Info added since	Results
1	INZZ	(nickel ADJ monosilicide OR NiSi) AND (layer OR film) AND ratio AND temperature AND amorphous	unrestricted	5
2	INZZ	(nickel ADJ monosilicide OR NiSi) AND (layer OR film) AND temperature	unrestricted	575
3	INZZ	2 AND (Nickel OR Ni)	unrestricted	554
4	INZZ	3 AND (Si OR silicon)	unrestricted	531
5	INZZ	4 AND (anneal* OR (thermal OR heat) ADJ treatment)	unrestricted	28
6	INZZ	3 AND amorphous	unrestricted	116
7	INZZ	4 AND amorphous	unrestricted	116

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